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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/622,113

Applicant(s)

POHJOLA ET AL.

Examiner

LI LIU

Art Unit

2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,8-16,19-21,23,30,32-36 and 38-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 35,36 and 38-42 is/are allowed.
- 6) ☒ Claim(s) 1,4,8-16,19-21,23,30 and 32-34 is/are rejected.
- 7) ☒ Claim(s) 43 and 44 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 November 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-846)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on 7/28/2009 have been fully considered but they are not persuasive and are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1, 4, 8-16, 19-21, 23, 30 and 32-34 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

1). Claim 1, and thus depending claims 4, 8-15, 20, 33 and 34, recites the limitation "a wavelength division multiplexer (WDM) configured to route the data modulated pumping light to the plurality of optically pumped sources". However, according to the original disclosure, "Each laser cavity (LC) 612 is associated with an upstream/downstream WDM 613. The upstream/downstream WDM 613 is configured to provide downstream routing to the ONU by-passing the LC and upstream routing of data modulated pumping light from the ONU via the LC" (page 14, [0067]), and "there is a single laser source producing light which is divided by a splitter to provide light to all

WDMs 613" (page 14, [0068]); and "Respective ones of the optically pumped gain elements 1012 and the upstream/downstream WDMs 1014 are associated with each other. Each optically pumped gain element 1012 and associated upstream/downstream WDM 1014 corresponds to a respective ONU (not shown) which is connected separately to the arrangement 1000 by a respective optical fibre 1015 (page 19, [0087], and Figure 10). That is, each optically pumped source is associated with a specific upstream/downstream WDM and a respective ONU; and a plurality of upstream/downstream WDMs are included in the router. The original disclosure does not expressly disclose that a single WDM routes the data modulated pumping light to the plurality of optically pumped sources. Although, the applicant states "the AWG 1010 and the upstream/downstream WDMs 1014 are shown separately, they may be integrated together as a single unit" (page 21, [0094]), the AWG and WDMs are just put on a single unit, not on separated part; and a plurality of WDMs are still on the single unit. And the specification does not expressly disclose "a wavelength division multiplexer (WDM) configured to route the data modulated pumping light to the plurality of optically pumped sources" and does not disclose how a single WDM is used "to route the data modulated pumping light to the plurality of optically pumped sources". The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

2). Claim 16, and thus depending claims 21 and 23, recites the limitation "receiving data modulated pumping light from a plurality of optical network units via a

wavelength division multiplexer (WDM)". However, according to the original disclosure, "Each laser cavity (LC) 612 is associated with an upstream/downstream WDM 613. The upstream/downstream WDM 613 is configured to provide downstream routing to the ONU by-passing the LC and upstream routing of data modulated pumping light from the ONU via the LC" (page 14, [0067]), and "there is a single laser source producing light which is divided by a splitter to provide light to all WDMs 613" (page 14, [0068]); and "Respective ones of the optically pumped gain elements 1012 and the upstream/downstream WDMs 1014 are associated with each other. Each optically pumped gain element 1012 and associated upstream/downstream WDM 1014 corresponds to a respective ONU (not shown) which is connected separately to the arrangement 1000 by a respective optical fibre 1015 (page 19, [0087], and Figure 10). That is, each optically pumped source is associated with a specific upstream/downstream WDM and a respective ONU; and a plurality of upstream/downstream WDMs are included in the router. The original disclosure does not expressly disclose that a single WDM receives data modulated pumping light from a plurality of optical network units. Although, the applicant states "the AWG 1010 and the upstream/downstream WDMs 1014 are shown separately, they may be integrated together as a single unit" (page 21, [0094]), the AWG and WDMs are just put on a single unit, not on separated part; and a plurality of WDMs are still on the single unit. And the specification does not expressly disclose "receiving data modulated pumping light from a plurality of optical network units via a wavelength division multiplexer (WDM)" and does not disclose how a single WDM receives "data modulated pumping

light from a plurality of optical network units via a wavelength division multiplexer (WDM)". The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

3). Claim 19, and thus depending claims 301 and 32, recites the limitation "receiving data modulated pumping light from a plurality of optical network units via a wavelength division multiplexer (WDM)". However, according to the original disclosure, "Each laser cavity (LC) 612 is associated with an upstream/downstream WDM 613. The upstream/downstream WDM 613 is configured to provide downstream routing to the ONU by-passing the LC and upstream routing of data modulated pumping light from the ONU via the LC" (page 14, [0067]), and "there is a single laser source producing light which is divided by a splitter to provide light to all WDMs 613" (page 14, [0068]); and "Respective ones of the optically pumped gain elements 1012 and the upstream/downstream WDMs 1014 are associated with each other. Each optically pumped gain element 1012 and associated upstream/downstream WDM 1014 corresponds to a respective ONU (not shown) which is connected separately to the arrangement 1000 by a respective optical fibre 1015 (page 19, [0087], and Figure 10). That is, each optically pumped source is associated with a specific upstream/downstream WDM and a respective ONU; and a plurality of upstream/downstream WDMs are included in the router. The original disclosure does not expressly disclose that a single WDM receives data modulated pumping light from a

plurality of optical network units. Although, the applicant states "the AWG 1010 and the upstream/downstream WDMs 1014 are shown separately, they may be integrated together as a single unit" (page 21, [0094]), the AWG and WDMs are just put on a single unit, not on separated part; and a plurality of WDMs are still on the single unit. And the specification does not expressly disclose "receiving data modulated pumping light from a plurality of optical network units via a wavelength division multiplexer (WDM)" and does not disclose how a single WDM receives "data modulated pumping light from a plurality of optical network units via a wavelength division multiplexer (WDM)". The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 4, 8-10, 13-16, 19, 21, 23, 30, 32 and 33 rejected under 35 U.S.C. 103(a) as being unpatentable over Morales et al (US 5,706,111) in view of Kim et al (Kim et al: "A Low-Cost WDM Source with ASE Injected Fabry-Perot Semiconductor Laser", IEEE Photonics Technology Letters, Vol. 12, No. 8, August 2000, page 1067-

1069) and Stubkjaer (Stubkjaer: "Semiconductor Optical Amplifier-Based All-Optical Gates for High-Speed Optical Processing", IEEE Journal on Selected Topics in Quantum Electronics, Vol. 6, No. 6, November/December 2000, pages 1428-1435).

1). With regard to claim 1, Morales et al discloses an optical data transmission system (e.g., Figures 2 and 3), comprising:

a hub (e.g., the switch center CE in Figure 2);

a kerb location (the access node AN in Figure 2) having an optical router (the multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23, the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE) and a plurality of optically pumped sources (e.g., the OAB in Figure 2; Morales et al discloses that "the conversion to electrical signals takes place only in the network terminating equipment to which the subscriber terminals are connected", column 3, line 63-65; and "consideration is being given to the need for using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks", column 1, line 16-20; therefore, a plurality of optically pumped sources are presented in the AN); and

a plurality of optical network units (e.g., the optical network terminals ONT in Figure 2) each corresponding to one of the plurality of optically pumped sources (e.g., OAB in Figure 2), wherein each optical network unit has a laser for producing data modulated pumping light for transmission to its respective optically pumped source (the

laser in each ONT generates data modulated pumping light, e.g., λ_a , or λ_d or λ_e in Figure 2, to the OAB);

wherein the optical router comprises a wavelength division multiplexer (WDM) configured to route the data modulated pumping light to the plurality of optically pumped sources (e.g., Figure 2, the WDM routes the data modulated pumping light from ONT to the plurality of optically pumped sources OAB. Note: the WDM is between the ONT and OAB), and

wherein the optical router is configured to route wavelength channels to the hub (the optical router: multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23; the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE or hub).

But, Morales et al does not expressly state that the kerb location is a passive kerb location; wherein each optically pumped source is configured to receive injection light from an injection source outside the passive kerb location and to receive the data modulated pumping light from its respective optical network unit, wherein the plurality of optically pumped sources is configured to form data modulated transmission light at a predefined wavelength range assigned to its respective optical network unit, wherein the data modulated transmission light is based on the injection light and the data modulated pumping light, wherein each predefined wavelength range corresponds to a distinct wavelength channel.

However, Kim et al teaches a plurality of injection-locked sources (e.g., F-P SLD in Figures 1 and 5) configured to receive injection light from an injection source (the

Broad-band ASE source in Figures 1 and 5) outside the passive kerb location and to receive the data modulated pumping signal (e.g., the PRBS in Figure 1) from its respective optical network unit, wherein the injection-locked source is configured to form data modulated transmission light (the light sent from F-P SLD to the AWG) at a predefined wavelength range assigned to its respective optical network unit (Figure 5, each ONU assigned a specific wavelength predefined by the ASE source and the AWG) wherein the data modulated transmission light is based on the injection light and the data modulated signal (Figures 1, 2 and 5, the data modulated transmission light is based on the injection light due to the injection locking, and the data is modulated on the transmission light), and wherein each predefined wavelength range corresponds to a distinct wavelength channel (the AWG slices the broad band ASE source and routes the individual wavelength to respective F-P SLD).

But, Kim et al does not expressly state that the data signal used to pump the F-P SLD is an optical signal, or the F-P SLD is "optically pumped source".

However, to use an optical data signal to pump an injection locking source is well known in the art. Stubkjaer teaches an optical wavelength converter (e.g., Figure 1a) in which a data signal λ_1 pumps the optically pumped source (Optical gate, the injection light is CW light λ_2). Stubkjaer discloses that the opto-electronic conversion is avoided (page 1428, left column).

Morales et al teaches that the wavelength converter or optically pumped source can be placed at the kerb location (e.g., AN in Figure 2). The combination of Kim et al and Stubkjaer teaches an optically pumped injection-locked light source. And Kim et al

and Stubkjaer teach a cost-effective and highly reliable and flexible optical WDM system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the injection-locked light source as taught by Kim et al and Stubkjaer to the access node (or kerb location) of Morales et al so that a passive kerb location can be obtained and a cost-effective and highly reliable and flexible WDM network can be realized.

2). With regard to claim 4, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein the data modulated pumping light is within a wavelength range which does not include the wavelength or wavelengths of the wavelength channels (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the wavelength channels are λ_1 , λ_2 , ..., λ_m , Figure 2 of Morales).

3). With regard to claim 8, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein respective ones of the optical network units are sufficiently similar so that they are interchangeable (column 3, line 13-18, and column 4 line 59-67, the ONTs are identical to each other).

4). With regard to claim 9, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein the optically pumped sources are injection locked lasers (the F-P SLD as in Figures 1 and 5 of Kim) configured to receive injection light (the light from the Broad-band ASE source in Figures 1 and 5), and wherein the

injection source of the injection light is upstream from the passive kerb location (e.g., the injection light is from the center office, Figure 5).

5). With regard to claim 10, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein an injection wavelength is selected by at least one of a wavelength division multiplexer or an arrayed waveguide grating (e.g., the AWG in Figure 1 and 5 of Kim et al select the injection wavelength).

6). With regard to claim 13, Morales et al and Kim et al and Stubkjaer to disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein the data modulated pumping light is at a wavelength different from the wavelength of light used to carry data traffic in upstream from the kerb location and downstream from the hub (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the wavelength used to carry data traffic in upstream and downstream directions are $\lambda_1, \lambda_2, \dots, \lambda_m$, Figure 2 of Morales).

7). With regard to claim 14, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al further discloses wherein the optical router comprises a wavelength division multiplexer multiplexer (the multiplexer in the AN/OAB, the multiplexer multiplexes the m different wavelengths, $\Sigma \lambda_i$, over one of the optical fibers to the CE: column 4, line 27, and column 5 line 22-23).

8). With regard to claim 15, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. And Morales et al and Kim et al and

Stubkjaer further discloses wherein the optical router comprises an arrayed wavelength grating (e.g., the AWG in Figure 1 and 5 of Kim et al can be the optical router).

9). With regard to claim 16, Morales et al discloses a method of optically transmitting data, the method comprising:

receiving data modulated pumping light from a plurality of optical network units via a wavelength division multiplexer (WDM) (e.g., Figure 2, the access node AN receives data modulated pumping light, e.g., λ_a , or λ_d or λ_e from the ONTs via a WDM. Refer to Figure 2, the WDM is between the ONT and OAB) at a kerb location (the access node AN in Figure 2) in an optical data transmission system (e.g., Figures 2 and 3), wherein the kerb location comprises a plurality of optically pumped sources each assigned to a respective optical network unit (e.g., Figure 2, each OAB is assigned to respective ONU; and the OAB converts the data modulated pumping light, e.g., λ_a , from each optical network unit into data modulated transmission light, e.g., λ_i);

wherein each optical network unit is assigned a distinct predefined wavelength range for its data modulated transmission light corresponding to a distinct wavelength channel (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the wavelength channels are $\lambda_1, \lambda_2, \dots, \lambda_m$, Figure 2 of Morales; the OAB converts the data modulated pump signal, e.g., λ_a , into data modulated wavelength channel, e.g., λ_i); and wherein said converting is performed without an intermediate conversion to or from an electrical signal (Morales et al discloses that "the conversion to electrical signals takes place only in the network terminating equipment to which the subscriber terminals are connected", column 3, line 63-65; and "consideration is being given to the need for

using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks", column 1, line 16-20; therefore, the data modulated pumping light is passively converted into the distinct wavelength channels, performed without any intermediate conversion to or from an electrical signal); and

routing the wavelength channels each having distinct predefined wavelength ranges assigned to respective optical network units for transmission to a hub with a passive optical router (the optical router: multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23; the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE or hub).

But, Morales et al does not expressly state that the kerb location is a passive kerb location; and receiving injection light from an injection source at the passive kerb location, wherein each optically pumped source includes a laser cavity configured to select a distinct resonance peak of an incident light, and wherein the optically pumped sources are configured to form data modulated transmission light based on the injection light and the data modulated pumping light; and passively converting the data modulated pumping light from each optical network unit into data modulated transmission light based on the injection light and the data modulated pumping light.

However, Kim et al teaches a plurality of injection-locked sources (e.g., F-P SLD in Figures 1 and 5) configured to receive injection light from an injection source (the Broad-band ASE source in Figures 1 and 5) outside the passive kerb location. The injection locked sources (the F-P SLD in Figures 1 and 5) including a plurality of laser

cavities (Fabry-Perot Laser cavity in Figures 1 and 5) configured to select a distinct resonance peak of an incident light (the injection light from the broad-band source and AWG determine the appropriate resonance peak of the F-P laser, Figure 2); and injection locking sources configured to form data modulated transmission light based on the injection light and the data pumping signal (Figure 1, 2 and 5); and passively converting the data signals from each optical network unit (the ONU in Figures 1) into data modulated transmission light (the signals sent from F-P SLD to the AWG) based on the injection light and the data signals.

But, Kim et al does not expressly state that the data signal used to pump the F-P SLD is an optical signal, or the F-P SLD is "optically pumped source".

However, to use an optical data signal to pump an injection locking source is well known in the art. Stubkjaer teaches an optical wavelength converter (e.g., Figure 1a) in which a data signal λ_1 pumps the optically pumped source (Optical gate, the injection light is CW light λ_2). Stubkjaer discloses that the opto-electronic conversion is avoided (page 1428, left column).

Morales et al teaches that the wavelength converter or optically pumped source can be placed at the kerb location (e.g., AN in Figure 2). The combination of Kim et al and Stubkjaer teaches an optically pumped injection-locked light source without a supply of electricity. And Kim et al and Stubkjaer teach a cost-effective and highly reliable and flexible optical WDM system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the injection locking light source as taught by Kim et al and Stubkjaer to the access node (or kerb

location) of Morales et al so that a passive kerb location without a supply of electricity can be obtained and a cost-effective and highly reliable and flexible WDM network can be realized.

10). With regard to claim 19, Morales et al discloses an optical data transmission system (e.g., Figures 2 and 3), comprising:

receiving means for receiving data modulated pumping light from a plurality of optical network units via a wavelength division multiplexer (WDM) at a passive kerb location (e.g., Figure 2, the access node AN receives data modulated pumping light, e.g., λ_a , or λ_d or λ_e from the ONTs via a WDM. Refer to Figure 2, the WDM is between the ONT and OAB), wherein the kerb location comprises a plurality of optically pumped sources each assigned to a respective optical network unit (e.g., Figure 2, each OAB is assigned to respective ONU).

converting means (e.g., the OAB in Figure 2) for passively converting the data modulated pumping light from each optical network unit into data modulated transmission light (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the data modulated transmission light are $\lambda_1, \lambda_2, \dots, \lambda_m$, Figure 2), wherein each optical network unit is assigned a predefined wavelength range for its data modulation transmission light corresponding to a distinct wavelength channel ($\lambda_1, \lambda_2, \dots, \lambda_m$, Figure 2), and wherein the converting means does not convert the data modulated transmission light to or from an electrical signal (Morales et al discloses that "the conversion to electrical signals takes place only in the network terminating equipment to which the subscriber terminals are connected", column 3, line 63-65; and "consideration

is being given to the need for using completely optical networks in which both transmission and switching take place in the optical domain, thereby avoiding the successive opto-electrical conversion stages that occur in present networks", column 1, line 16-20; therefore, the data modulated pumping light is passively converted into the distinct wavelength channels, and the OAB does not convert the data modulated transmission light to or from an electrical signal); and

routing means for routing the wavelength channels having predefined wavelength ranges assigned to respective optical network units for transmission to a hub with an optical router (the optical router: multiplexer in the AN and the optical access board OAB: column 4, line 27, and column 5 line 22-23; the multiplexer multiplexes the m different wavelengths over one of the optical fibers to the CE or hub).

But, Morales et al does not expressly state: receiving injection light from an injection source at the kerb location, and the kerb location is a passive kerb location; and the optically pumped source includes a laser cavity configured to select a distinct resonance peak of an incident light, and wherein the optically pumped sources are configured to form data modulated transmission light based on the injection light and the data modulated pumping light; converting means for passively converting the data modulated transmission light from ONU into data modulated transmission light based on the injection light and the data modulated pumping light; and wherein the converting means does not require a supply of electricity to convert the data modulated transmission light.

However, Kim et al teaches a plurality of injection-locked sources (e.g., F-P SLD in Figures 1 and 5) configured to receive injection light from an injection source (the Broad-band ASE source in Figures 1 and 5) outside the passive kerb location. The injection locked sources (the F-P SLD in Figures 1 and 5) including a plurality of laser cavities (Fabry-Perot Laser cavity in Figures 1 and 5) configured to select a distinct resonance peak of an incident light (the injection light from the broad-band source and AWG determine the appropriate resonance peak of the F-P laser, Figure 2); and the injection locked sources are configured to form data modulated transmission light based on the injection light and the data pumping signal (Figure 1 and 5); and passively converting the data signals from each optical network unit (the ONU in Figures 1) into data modulated transmission light (the signals sent from F-P SLD to the AWG) based on the injection light and the data signals.

But, Kim et al does not expressly state that the data signal used to pump the F-P SLD is an optical signal, or the F-P SLD is "optically pumped source".

However, to use an optical data signal to pump an injection locking source is well known in the art. Stubkjaer teaches an optical wavelength converter (e.g., Figure 1a) in which a data signal λ_1 pumps the optically pumped source (Optical gate, the injection light is CW light λ_2). Stubkjaer discloses that the opto-electronic conversion is avoided (page 1428, left column).

Morales et al teaches that the wavelength converter or optically pumped source can be placed at the kerb location (e.g., AN in Figure 2). The combination of Kim et al and Stubkjaer teaches an optically pumped injection-locked light source without a

supply of electricity. And Kim et al and Stubkjaer teach a cost-effective and highly reliable and flexible optical WDM system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the injection locking light source as taught by Kim et al and Stubkjaer to the access node (or kerb location) of Morales et al so that a passive kerb location can be obtained and a cost-effective and highly reliable and flexible WDM network can be realized.

11). With regard to claim 21, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 16 above. And the combination of Morales et al and Kim et al and Stubkjaer further discloses the method comprising optically pumping, at the passive kerb location, the plurality of optically pumped sources with the plurality of respective data modulated pumping light (Morales: the data signals as pump signal are optical signals with wavelength λ_a , or λ_d or λ_e , Figure 2 of Morales).

12). With regard to claim 23, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 16 above. And Morales et al further discloses wherein the data modulated pumping light signals are within a wavelength range which does not include the wavelength or wavelengths of the wavelength channels (the wavelength of the data signal as pump signals is λ_a , or λ_d or λ_e , and the wavelength used to carry data traffic in upstream and downstream directions are λ_1 , λ_2 , ... λ_m , Figure 2 of Morales).

13). With regard to claim 30, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 19 above. And Morales et al further discloses the method comprising pumping means for optically pumping the plurality of

optically pumped sources at the passive kerb location (e.g., the optical wavelength converter in OAB Figure 2 of Morales et al).

14). With regard to claim 32, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 19 above. And the combination of Morales et al and Kim et al and Stubkjaer further discloses wherein the optical signals are within a wavelength range which does not include the wavelength or wavelengths of the wavelength channels (Morales: the wavelength of the data signal as pump signals is λ_a , or λ_o or λ_e , and the wavelength used to carry data traffic in upstream and downstream directions are $\lambda_1, \lambda_2, \dots \lambda_m$, Figure 2 of Morales).

15). With regard to claim 33, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 19 above. And Morales et al and Kim et al and Stubkjaer further discloses wherein the injection light is amplified spontaneous emission noise produced by an upstream preamplifier (e.g., the broad-band ASE source of Kim et al).

6. Claims 11, 12, 20 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morales et al and Kim et al and Stubkjaer as applied to claims 1, 9, 10 above, and in further view of Zah (US 6,434,175).

1). With regard to claim 11, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. But Morales and Kim et al and Stubkjaer do not expressly disclose wherein the optically pumped sources comprise external cavity lasers.

However, the external cavity laser is well known in the art. Zah teaches such a laser, a multiwavelength laser includes a multiplexer (inside the laser cavity) for providing wavelength accuracy and reflectors for forming laser cavity (Figure 1, column 2, line 5-10, and column 3 line 58 to column 4 line 34). Zah teaches a plurality of optical gain sources (e.g., the optical gain medium 118 in Figure 1), the optical gain sources each comprising an external laser cavity (laser cavity 142 is formed by the mirror 136 and facet 332 in Figure 1), mirrors defining the cavity (the mirror 136 and facet 332 define the external cavity).

Zah provide laser with a high wavelength accuracy and selectivity, simplified packaging and compactness, without complications, to support the DWDM applications. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the external cavity laser as taught by Zah to the system of Morales et al and Kim et al and Stubkjaer so that a compact, high wavelength accuracy and selectivity multiwavelength laser system can be obtained.

2). With regard to claim 12, Morales et al and Kim et al and Stubkjaer and Zah disclose all of the subject matter as applied to claims 1 and 11 above. And the combination of Morales and Kim et al and Stubkjaer and Zah further discloses wherein the optical router is within a laser cavity of at least one optically pumped source (Zah: the multiplexer PHASAR MUX/the wavelength router, is inside the laser cavity).

3). With regard to claim 20, Morales et al and Kim et al and Stubkjaer disclose all of the subject matter as applied to claim 1 above. But Morales and Kim et al and Stubkjaer do not expressly disclose the optically pumped sources each comprising a

laser cavity, mirrors defining the cavity, and wavelength selective elements inside the cavity.

However, a laser cavity with the wavelength selective element inside, such as the phasar laser, is well known and widely practice in the art. Zah teaches such a laser, a multiwavelength laser includes a multiplexer (PHASAR MUX inside the laser cavity) for providing wavelength accuracy and reflectors for forming laser cavity (Figure 1, column 2, line 5-10, and column 3 line 58 to column 4 line 34). Zah teaches a plurality of optical gain sources (e.g., the optical gain medium 118 in Figure 1), the optical gain sources each comprising a laser cavity (laser cavity 142 is formed by the mirror 136 and facet 332 in Figure 1), mirrors defining the cavity (the mirror 136 and facet 332 define the cavity), and wavelength selective elements (the phasar multiplexer 320 inside the cavity).

Morales et al and Kim et al and Stubkjaer teach a cost-effective WDM PON system. Zah provides laser with a high wavelength accuracy and selectivity, simplified packaging and compactness, without complications, to support the DWDM applications. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the laser cavity as taught by Zah to the system of Morales et al and Kim et al and Stubkjaer so that a cost-effective, compact, high wavelength accuracy and selectivity multiwavelength laser system can be obtained.

3). With regard to claim 34, Morales et al and Kim et al and Stubkjaer and Zah disclose all of the subject matter as applied to claims 1 and 11 above. And Zah further disclose wherein the external cavity laser is formed from narrow band reflectors. (e.g.,

the DBR 936 in Figure 8; although Zah calls the DBR 936 a broad band mirror, the DBR 936 can be viewed as a narrow band reflectors with respect to the broad band ASE source. In applicant's disclosure, the "narrow band reflectors", e.g., the reflector in Figure 8 or 1020 in Figure 10, have to pass all wavelengths λ_1 to λ_k , therefore, the reflector is not exactly "narrowband" reflector in conventional definition).

Allowable Subject Matter

7. Claims 35, 36 and 38-42 are allowed.
8. Claims 43 and 44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Monday-Friday, 8:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. L./
Examiner, Art Unit 2613
October 14, 2009

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/Kenneth N Vanderpuye/

Supervisory Patent Examiner, Art Unit 2613